In the original specification, claims 46-71 were pending. Claims 58, 64, 69 and 71 were withdrawn. Claims 46-57, 59-63, 65-68 and 70 are hereby canceled. New claims 72-118 are submitted with this.

Cancel Remaining claims

1. Please cancel claims 46-57, 59-63, 65-68,70 and 71.

Please enter the following new claims.

72. A process for treating wood having wood cellulose having a plurality of hydroxyl groups comprising the steps of:

providing a solution consisting essentially of a non-water-based hydrophilic organic solvent and a solute having a functional group comprising an atom selected from the group consisting of trivalent, tetravalent and pentavalent atoms, wherein said atom is bonded to a halogen atom or a functional group selected from the group consisting of a hydroxyl group, alkoxy group, phenoxy group, benzyloxy group and an aryloxy group having a polycyclic aromatic ring,

applying said solution to the wood cellulose,

covalently reacting said functional groups upon said applying to said wood.

73. The process according to claim 72 further comprising the steps of simultaneous reaction and diffusion of the monomers in the wood.

74. The invention of claim 72 wherein said reacting is exothermic.

75. The process according to claim 72 wherein the reaction is self-initiating.

76. The process of claim 72 wherein the reactive solute is comprised of monomers prior to application of the solute compound to said wood cellulose.

77. The process of claim 72 wherein the process further comprises the step of adding a catalyst to the solution.

78. The process of claim 77 wherein the catalyst is a substance which effects the

exothermic reaction of the functional group wherein the functional group bonds from the trivalent, tetravalent or pentavalent atom across an oxygen of the cellulose hydroxyl group.

79. The process of claim 78 wherein the catalyst is added to the wood cellulose after application of said solution to the wood cellulose.

80. The process of claim 78 wherein the catalyst is added to the solution prior to application of the solution to the wood cellulose.

81. The process of claim 78 wherein the catalyst is an acid or a base.

82. The process of claim 81 wherein the acid is produced by a pro-catalyst defined as a molecule producing an acid or base in the presence of wood cellulose or water in wood cellulose.

83. The process of claim 81 or 82 wherein the acid or procatalyst is in the range of 0.1-10% of the solution.

84. The process of claim 83 wherein the acid or procatalyst is in the range from 0.1 to 4.9% of the solution.

85. The process of claim 81 wherein the acid is or base is selected from the group consisting of acids from alkyl-halide monomers with trivalent, tetravalent and pentavalent atoms.

86. The process of claim 82 wherein the pro-catalyst is a molecule comprised of silicone and a halogen.

87. The process of claim 82 wherein the functional groups comprises pro-catalyst and non-pro-catalyst that react spontaneously on application to wood at standard atmospheric temperature and pressure.

88. The process of claim 87 wherein the non-pro-catalyst functional groups react exothermically and spontaneously with wood in the presence of a pro-catalyst, acid or base.

89. The process of claim 82 wherein the non-catalytic reagents would include alkyl and

hydroxyl or alkoxy bonded trivalent, pentavalent and tetravalent atoms.

90. The process of claim 85 wherein the catalyst is from the group consisting of hydrochloric, meta-phosphoric acid, poly-phosphoric acid, bases from metal alkoxides and Phosphoric acid, and combinations thereof.

91. The process of claim 85 wherein the acid or base generated from the catalyst is in the range of 0.01-10% *in situ*.

92. The process of claim 72 wherein the process further comprises avoiding the formation of oligomers of the functional groups prior to applying said solution to said wood.

93. The process of claim 72 further comprising the step of:

adding at least one non-reactive additive to the wood cellulose that enhances a desired property selected from the group consisting of:

fire resistance,
insect resistance,
moisture resistance
color,
adhesion, and
insulation, and
combinations thereof.

94. The process of claim 93 wherein the step of adding at least one non reactive additive further comprises adding the additive to the solution.

95. The process of claim 93 wherein the step of adding the at least one non-reactive additive occurs before reacting the functional groups to bond with the wood cellulose.

96. The process of claim 93 wherein the additive is selected from the group consisting of:

diatimatious earth,
sodium silicates,
boron or silicon salts,
boric acid,
trimethy (trialkyl) borate,
Boron Halides (BF3, BCl3, etc.),
Boric Anhydride (boron oxide),
phosphorous compounds,
copper compounds,
metal alkoxide,
meta-phosphoric acid;
a hydrophobic reagents,
phosphoric acid, and
metaphoshoric acid,
and combinations thereof.

97. The process of claim 72 wherein the solute compound comprises functional groups selected from the group consisting of R-Xa-Xb_3, R3-Xa-Xb, R2-Xa-Xb_2, R4-Xa, and XaR3 wherein R is the carbon compound, Xa is the trivalent, tetravalent or pentavalent atom and Xb is a halogen or alkoxy or hydroxyl group.

98. The process according to claim 72, wherein the wood cellulose has an original weight and wherein the duration of treatment attains a weight of compound which is covalently bonded to the wood cellulose in a range of 0.1 to 10 weight percent of the original weight of the wood cellulose.

99. The process according to claim 72, further comprising forming cyclic interlocking

molecules having as a part of the cyclic structure at least two carbons within the cellulose and at least two of the atoms from the functional groups consisting of trivalent, tetravalent and pentavalent atoms.

100. The process of claim 81 further comprising the step of exposing the acids introduced into the wood to an acid reducing compound subsequent to the treatment.

101. The process of claim 81 further comprising the step of introducing an acid reducing chemical into the wood prior to the exposure of the wood cellulose to the acid.

102. The process of claim 81 further comprising the step of exposing the bases introduced into the wood to a base neutralizing compound subsequent to the exposure of the wood cellulose to the acid.

103. The process of claim 81 further comprising the step of introducing an base neutralizing chemical into the wood prior to the exposure of the wood cellulose to the base.

104. A process according to claim 72 wherein the wood cellulose is not dry and wherein the functional groups are solvated by the water in the wood prior to being covalently bonded to the hydroxyl groups of said wood cellulose.

105. The process according to claim 72 further comprising the step of adding water to the wood cellulose prior to applying the solution to the wood cellulose

106. A process for treating wood cellulose having a plurality of hydroxyl groups comprising the steps of:

providing a solution comprised of a non-water-based hydrophilic organic solvent and a solute having a plurality of monomers comprising an atom selected from the group consisting of tri-valent, tetravalent and pentavalent atoms, wherein said atom is bonded to a halogen atom or

a functional group selected from the group consisting of a hydroxyl group, alkoxy group, phenoxy group, benzyloxy group and an aryloxy group having a polycyclic aromatic ring,

applying said solution to the wood cellulose; and simultaneously diffusing said solution within said wood and

reacting said solute to form covalent bonds, and

forming a matrix structure comprising reacted monomers and wood cellulose.

107. The process of claim 106 further comprising the step of:

adding at least one non-reactive additive that enhances a desired property selected from the group consisting of:

fire resistance,

insect resistance,

moisture resistance

color,

adhesion, and

insulation, and

combinations thereof.

108. The process of claim 107 wherein the step of adding the at least one non-reactive additive occurs before covalently bonding the compound to the wood cellulose.

109. The process of claim 106 further comprising the step of repeating the step of reacting said solute to form covalent bonds with other molecules of said solute in conjunction with the step of covalently bonding the molecules of the solute to the wood cellulose.

110. The process according to claim 106, further comprising a step of exposing the wood to ultra-sound sonification while applying said solution.

111. A process for treating wood cellulose having a plurality of hydroxyl groups comprising the steps of:

providing a solution comprised of a non-water-based hydrophilic organic solvent; a pro-catalyst reactant diffused as a chemical from the solution and bonding with wood in conjunction with water in the wood and generating in the bonding a catalyst; and a non-pro-catalyst reactant diffused as a chemical from the solution and bonding with wood cellulose in the presence of the catalyst generated by the pro-catalyst.

112. The process of claim 111 wherein the catalyst is an acid or base produced by the pro-catalyst defined as a molecule producing an acid or a base causing a spontaneous reaction of the non-pro catalyst with the wood cellulose in the presence of wood cellulose or water in wood cellulose.

113. The process of claim 112 wherein the acid or procatalyst is in the range of 0.1-10% of the solution.

114. The process of claim 112 wherein the acid or procatalyst is in the range from 0.1 to 4.9% of the solution.

115. The process of claim 112 wherein the acid is or base is selected from the group consisting of acids from alkyl-silicon halides, acids from alkyl-halide monomers with trivalent, tetravalent and pentavalent atoms, hydrochloric, meta-phosphoric acid, poly-phosphoric acid, bases from metal alkoxides and Phosphoric acid and combinations thereof, wherein the acid or base is in the range of 0.01-10% *in situ*.

116. The process of claim 112 wherein the pro-catalyst is a molecule comprised of silicone and a halogen.

117. The process of claim 112 wherein the non-pro-catalyst functional groups react exothermically and spontaneously with wood in the presence of a pro-catalyst.